Novel System Concepts

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Before we begin hearing from Program Managers—who will tell you about some of the more interesting work going on at DARPA—I want to give you a look at the future vision that is emerging at DARPA and talk briefly about a few of the novel system concepts that we are pursuing.

Systems Office Investment Strategy

- Critical Military Mission Focus
  - Early entry, engagement, and sustainment
  - Situation understanding, targeting, and precision strike
  - Unmanned warfare
- Joint Service Focus
  - Stimulate adoption of advanced systems architectures and technologies
  - Leverage service investments and commitment through cooperative programs
- Efficient Industrial Focus
  - Rapid system design and development cycle
  - Low cost manufacturing through automation and modeling
  - Government & Business acquisition reform

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The investment strategy of DARPA Systems Offices—that is ISO, TTO, and STO—tends to focus in three areas as shown. Critical military missions represent our vision of where U.S. forces can most effectively utilize advanced technologies to meet anticipated future challenges. Joint service activities reflect the trend and growing need for the four services to closely coordinate their operations and to pursue systems that support joint activities. Finally, DARPA pursues design and manufacturing technology that promotes greater efficiency within the defense industry.

High-Leverage Military Missions

- Situation Awareness, Targeting, and Precision Strike
  - Counter CC&D (Camouflage, Concealment, and Deception)
  - Rapid, agile, global access
  - Dominant situation awareness
- Early Entry, Engagement, and Sustainment
  - Control of littoral environments
  - Dispersed, coherent ground forces
  - Remote fires
  - Light, agile forces
- Unmanned Warfare
  - Responsive, accurate, deep strike
  - Robotic infantry augmentation

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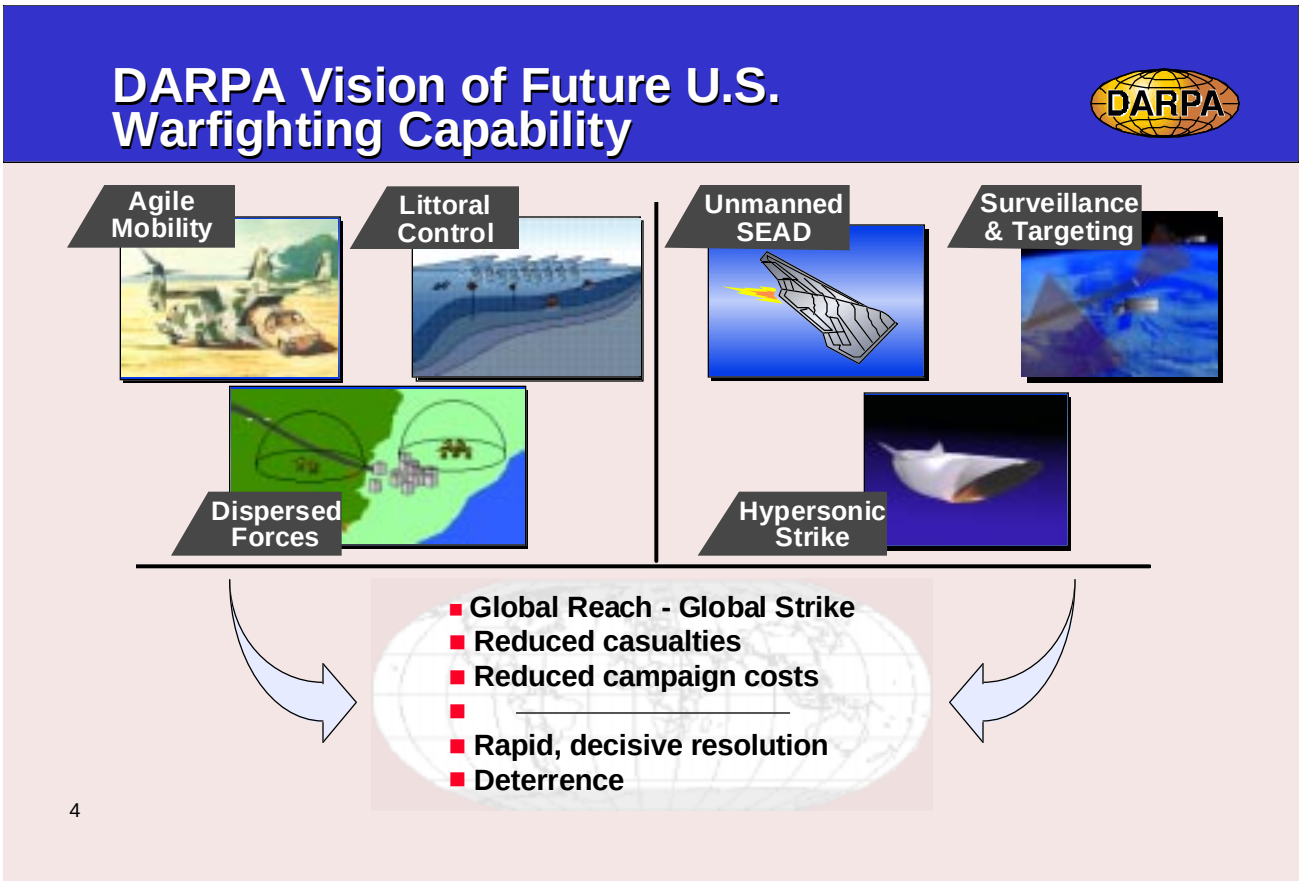
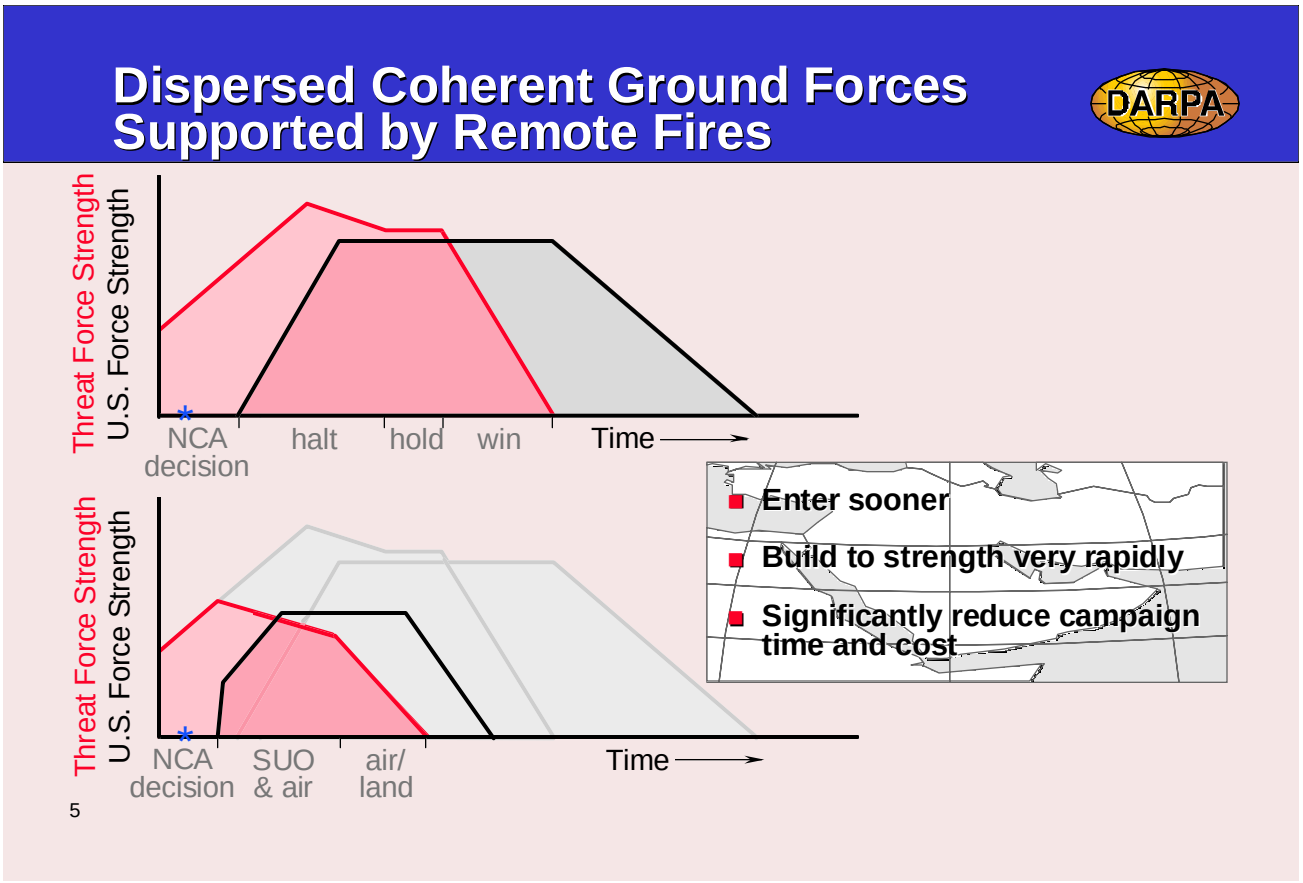
DARPA's vision of military challenges in the future calls for technology development in three areas. Situation awareness, targeting, and precision strike efforts are a result of the many lessons learned from Operation Desert Storm and the anticipated capabilities and methods of potential future adversaries. Early entry, engagement, and sustainment activities are motivated by these same issues. Unmanned warfare is an emerging technological capability driven by a strong desire to minimize U.S. casualties and enabled by advances in computing, communications, sensor, and robotics technologies.

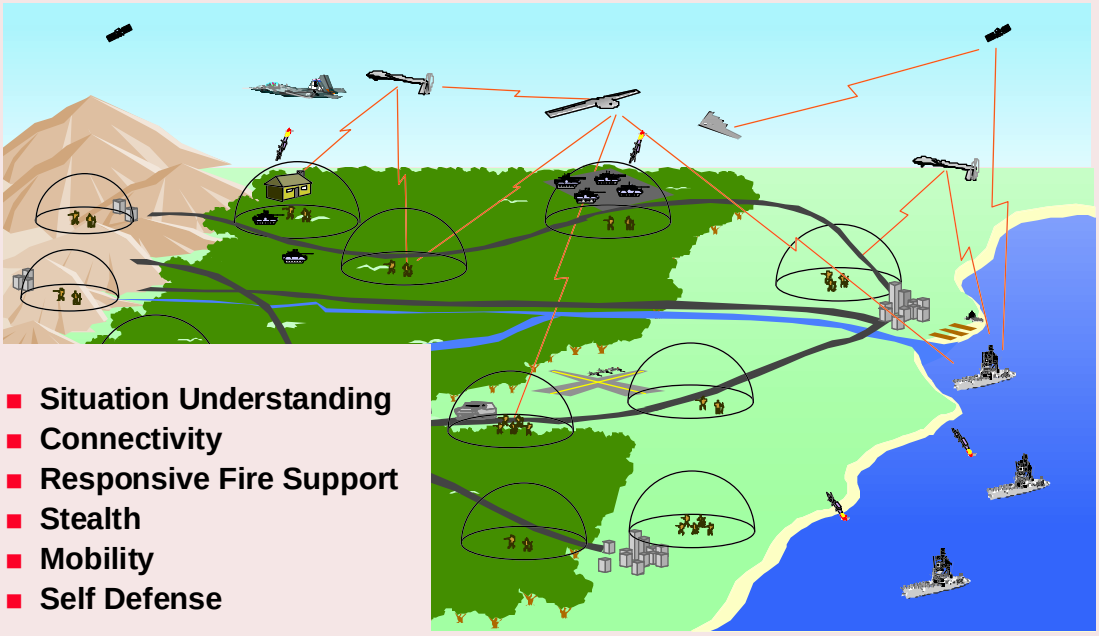


Emerging DARPA technologies will provide warfighters with an unprecedented range of capabilities to meet future challenges. A capability to react rapidly and decisively anywhere on the globe will result in reduced casualties, reduced campaign costs and deterrence.



The ability of our forces to respond to crises is limited today by the size of force required and by the time required to build to warfighting strength. Dispersed coherently coordinated ground forces possessing dominant situation understanding and supported by remote fires will be able to enter sooner and build to strength very rapidly. This will significantly reduce campaign time and costs.

Distributed - Aware - Lethal



- Situation Understanding
- Connectivity
- Responsive Fire Support
- Stealth
- Mobility
- Self Defense

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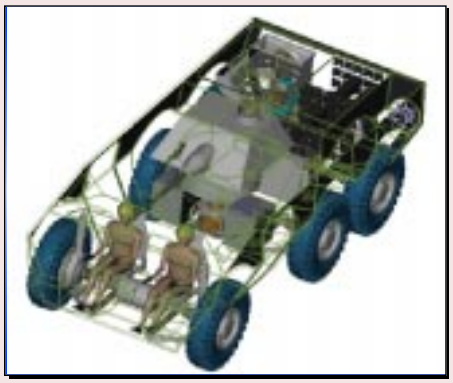
DARPA technologies will allow ground forces to disperse into small units in order to reduce the threat from WMD. Situation awareness technologies will enable coherent operations among dispersed forces while remote fires will provide them the firepower required to engage much larger, conventionally deployed units.

Agile Land Mobility

- Reduced signatures
- Double combat radius
- Very agile
- Increased lethality
- Increased survivability
- Reduced logistics



- Hybrid-electric power
- Integrated survivability suite
- Advanced engines/drive
- Active suspension
- High-energy weapons

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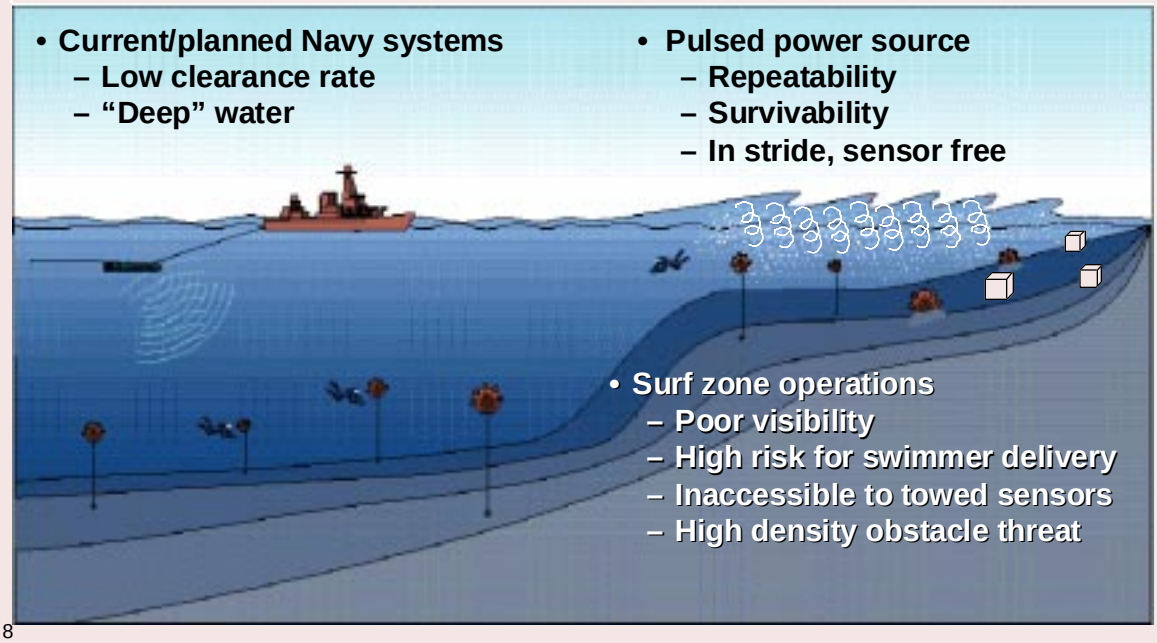
Agile mobility of land vehicles is an important element of DARPA's future vision. Lighter weight vehicles with greater range, speed, lethality, and survivability will reduce the logistics burden while increasing warfighting capabilities. Advanced engines and drive mechanisms employing hybrid-electric power will double the combat radius while active suspensions will allow high-speed traversal of open ground.

In-Stride Littoral Theater Entry



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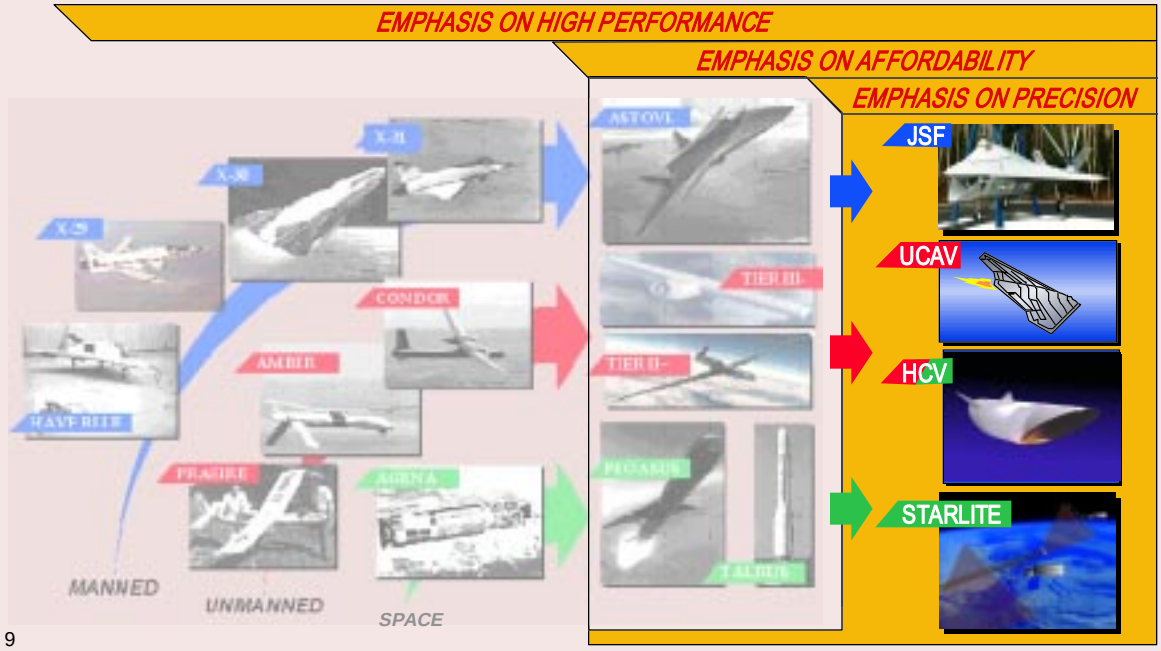
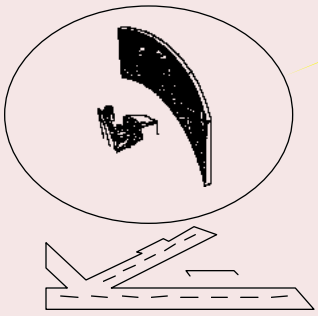
Obstacles in the littoral present a major challenge to marine deployment of forces. DARPA is developing a capability to rapidly clear paths through mine and obstacle fields by employing focused, underwater shock waves.

DARPA's Aerospace Legacy & Future Vision

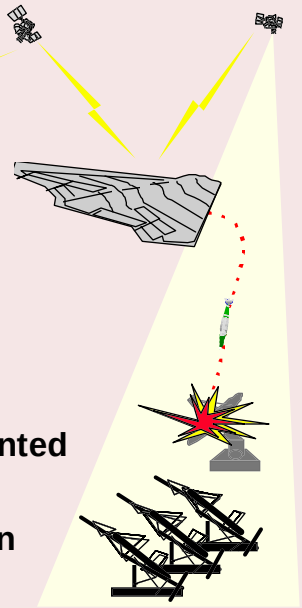


DARPA has a history of aerospace technology development in manned and unmanned aircraft and in spacecraft. Past emphasis was solely on high performance then later on high performance at an affordable cost. Today we add precision to that list. JSF is a relatively mature effort to develop a multi-mission strike fighter to address Navy, Marine, and Air Force needs. The Unmanned Combat Air Vehicle is an affordable, survivable, and effective aircraft for SEAD and strike missions. The Hypersonic Combat Vehicle is an emerging effort to develop a low-cost, high-Mach missile capable of precision delivery over large distances. Starlite is another emerging program that will demonstrate an affordable approach to space-based radar providing near-continuous, near-real-time surveillance and targeting.

Unmanned Combat Air Vehicle



- Affordable, survivable, effective SEAD/strike
- Remove pilot from harm's way
- Variable levels of autonomy
- Over-the-horizon, robust communications
- Situation awareness augmented with off-board information
- Signature-compatible design



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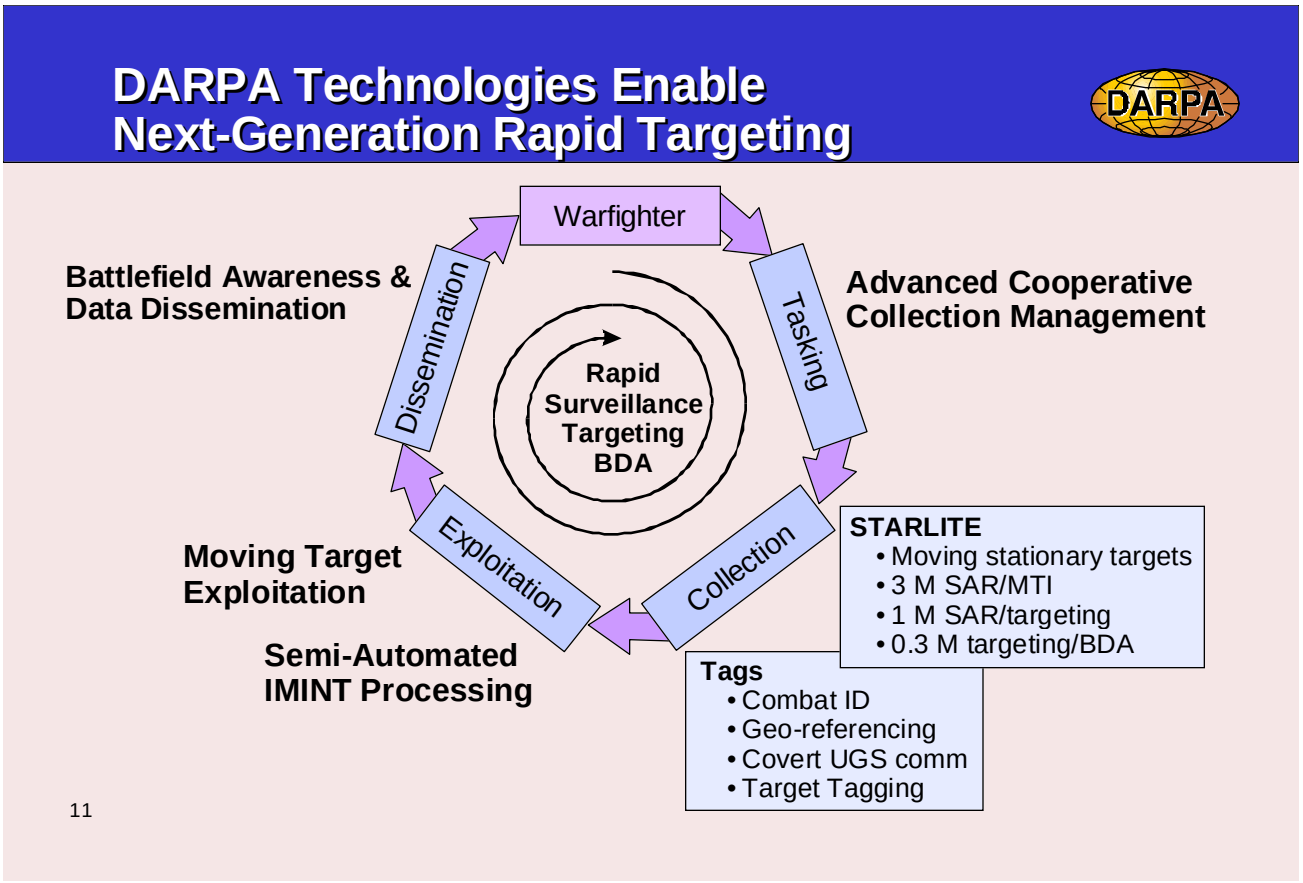
DARPA has developed UAV technology in the past in programs such as Amber and Condor and in two ongoing programs, Tier II+ and Tier III-. The next logical set along this path is to develop an unmanned strike aircraft; this is the goal of the Unmanned Combat Air Vehicle program. UCAV has a goal to achieve an affordable, survivable, and effective SEAD capability that removes the pilot from harm's way.

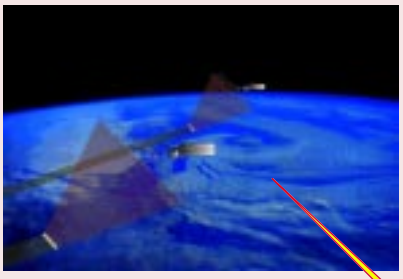


DARPA is developing technologies in several areas that, taken together, will enable next-generation rapid surveillance and targeting. Several of these you heard about yesterday in briefings from ISO, where they are developing important capabilities for tasking, exploitation, and dissemination of information. Plans call for these capabilities to be combined with collection elements in a rapidly executable loop for surveillance, targeting, and BDA.

STARLITE is a DARPA initiative that will provide the means to rapidly close the warfighter-information loop by providing near-continuous, broad area, moving and stationary target detection from space.

In addition, radar tags are being developed to enhance critical surveillance and targeting capabilities such as combat ID and geo-registration.

Surveillance Targeting And Reconnaissance Satellite (STARLITE)



- Large constellation of satellites (24 – 48)
- Leverage ground/surface infrastructure (CARS/ETRAC)
- Employ best practices (Iridium/Global Star)
- Minimal manning in theater and CONUS

- Theater-wide access
- Day/night, all weather
- Near-continuous surveillance
- Global precision targeting
- High-resolution SAR & moving target exploitation (MTI)
- Direct theater tasking/downlink
- Worldwide precision DTED collection

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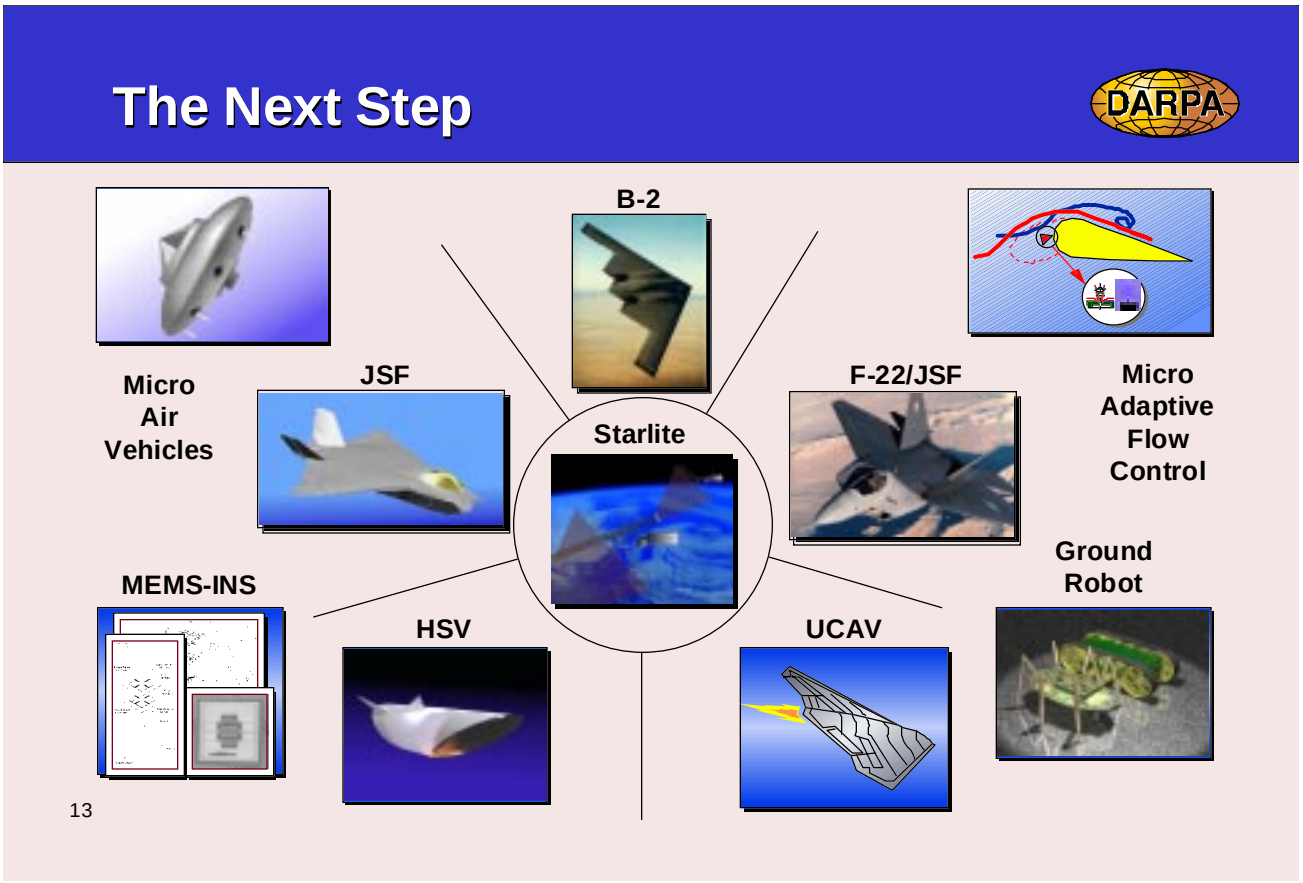
The main themes of the STARLITE initiative are shown here.

Leveraging of the existing ground/surface infrastructure is important in order to minimize costs and to allow seamless integration of STARLITE into the warfighting machine.

Employment of commercial practices is an important aspect of cost control, a program pacing issue.

STARLITE is often described as an unmanned satellite system. By this we mean that we intend to minimize the manpower required by all aspects of the system. This has a tremendous impact on costs as well as performance.

STARLITE will address both stationary and moving targets, a very important feature. With rapid revisit, there will be no place for the enemy to run and no place to hide without severely impacting his ability to wage war.



Where might we go next?

The military capability offered by a densely populated LEO constellation of orbital radars is quite impressive. Such a system could continuously collect intelligence data in peace time that would greatly increase our understanding of the situation in troubled areas of the world. We are currently working on technologies that will enable such a system to simultaneously collect detained information on both moving and stationary surface objects while at the same time look for electronic emissions.

In times of greatly heightened tensions or conflict, such an orbital radar system could come under direct control of military planners and warfighters and focus its attention on one or a few areas around the globe. Combined with existing assets such as the F-18, the B-2, and the F-22, plus emerging DARPA technologies such as the low-cost Hypersonic Vehicle and the Unmanned Combat Air Vehicle, the capability offered by STARLITE technology could enable an unprecedented, global military presence.